Appl. No.: 10/630,156
Amdt. Dated: 02/28/2006
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REMARKS/ARGUMENTS

Reconsideration of this application is respectfully requested in view of the foregoing amendments and discussion presented herein.

1. Rejection of Claims 1, 9-15, 17-19, and 21 under 35 U.S.C. § 102(e).

Claims 1, 9-15, 17-19, and 21 were rejected under 35 U.S.C. § 102(e) as being anticipated by Fuglevand et al. (U.S. No. 6,468,682). Applicant respectfully traverses the rejection, as supported by the following arguments.

(a) Fuglevand does not disclose a "bipolar separator plate". Each claim in the application requires a "bipolar separator plate" (BSP). Fuglevand does not disclose, in any manner, a BSP.

The Examiner identifies the "support member" (20) in Fuglevand as a "bipolar separator plate". This conclusion is incorrect. Fuglevand, at 3:33-36, discloses "a nonconductive, dielectric support member generally indicated by the numeral 20."

However, a bipolar plate ***is conductive to electricity***. See attached Exhibit A, an excerpt from the Fuel Cell Glossary, 2nd Ed., May 2000, defining "bipolar plates" and "separator plate" as follows:

> **BIPOLAR PLATES.**
>
> Conductive plate in a fuel cell stack that acts as an anode for one cell and a cathode for the adjacent cell. The plate may be made of metal or a conductive polymer (which may be a carbon-filled composite). The plate usually incorporates flow channels for the fluid feeds and may also contain conduits for heat transfer.
>
> **SEPARATOR PLATE.**
>
> A solid piece of electrically conductive material (usually a metal or graphite) that is inserted between cells in a stack.

The instant specification requires "a bipolar separator plate", which, according to the above-noted definitions, requires that the plate must conduct electricity, and act as an anode for one cell and a cathode for the adjacent cell.

Conversely, Fuglevand specifically requires a *nonconductive, dielectric support member*. A "dielectric" is "a nonconductor of direct electric current" (see Exhibit B, from the Merriam Webster On-Line Dictionary). Throughout the Fuglevand disclosure, the support member is disclosed as being "nonconductive" or "dielectric": see, e.g, 7:41: "***nonconductive*** support plate"; claim 11: "electrically ***nonconductive*** support member"; claim 12: "electrically ***nonconductive*** support member"; claim 41: "electrically ***nonconductive*** support member"; claim 52: "***nonconductive*** support member"; claim 53: "***nonconductive*** support member"; claim 71: "***dielectric*** support member" (emphasis added in each). Thus, the support member 20 cannot be a BSP because it is nonconductive.

(b) Fuglevand does not disclose contacts attached to the BSP and the MEA.

The Examiner states, with respect to claim 9, "the contacts (70) as shown in Figs. 2 and 3 are attached to the separator (20) and contact the MEAs via portion 71 (as shown in Figure 10)."

An examination of Fuglevand's Figure 3 and the specification shows this not to be the case. According to Figure 4, the contacts 70 are attached to and actually part of "a cathode current collector is generally designated by the numeral 60, and rests in ohmic electrical contact with the main body 51 of the individual conductor plates 50" (4:19-22). Figure 2, 3, and especially Figure 10 shows that a conductor plate 50 is in contact with each side of support member 20 and does not contact 70. (Note: In Figure 10 the indicator for the conductor plate 50 in the center of the figure is in error. It is actually indicating a cathode current collector 60 which is indicated correctly at the bottom of the figure. The conductor plate 50 is the item immediately to the left of the cathode current collector 60 and between the support member 20 indicated in the center of the figure toward the top and the cathode current collector 60.) In reference to Figure 4, "the main body 61 of the cathode current collector 60 defines a channel shaped member. The main body also has *a first surface 65 which rests in ohmic electrical contact against the main body 51 of the underlying conductor plate 50 and*

opposite second surface 66" (4:31-36) (emphasis added). Clearly, if surface 65 is in electrical contact with the main body 51 of conductor plate 50 it cannot be in contact with conductive member 70 which is on the opposite side of cathode current collector 60.

The conductor plates 50 shown in Figures 2 and 3 "are matingly received within the individual cavities 34 which are defined by support member 20" (4:5-8). In order for the contacts 70 to be in contact with the support member 20, the individual conductor plates 50 would need to be eliminated and the cathode current collectors 60 would need to be reversed.

Fuglevand does allow that the conductor plates 50 could be eliminated and "it is possible to fabricate a cathode current collector 60 having a conductive tab 54 which is made integral with the conductor plate 50. This would eliminate the necessity for the individual conductor plates 50" (5:2-6). Again, with the conductor plates 50 eliminated, in order for the contacts 70 to be in contact with the support member 20 the cathode current collectors 60 would need to be reversed.

Finally, this lack of contact bolsters the argument that Fuglevand's nonconductive support member cannot be a BSP. In order for support member 20 to be a BSP, it would need to "act as an anode for one cell and a cathode for the adjacent cell." It does neither. It is merely a support for the conductor plates 50 and the cathode current collectors 60. As seen in Figure 4, on both sides of support member 20 are conductor plates 50 and also on both sides of the support member 20 are cathode current collectors 60. (Cathode current collectors 60 are not indicated on the right side of Figure 3 but in the Section 4-4 of Figure 3 shown in the detail of Figure 4, the cathode current collector 60 is indicated.) Fuglevand further states, referring to Figures 1, 3, 6, 9 and 10, "[t]he ion exchange membrane fuel cell module 100 [this should be 10, not 100] further has a support member 20 disposed between the pair of membrane electrode diffusion assemblies 100, and wherein the cathode side 102 of each of the membrane electrode diffusion assemblies faces the support member" (13:28-33).

Clearly, if the cathode sides 102 of the membrane electrode diffusion assemblies 100 are facing the support member 20 and cathode current collectors 60 and conductor plates 50 are interposed between the cathode sides 102 of the membrane electrode diffusion assemblies 100 and the support member 20, by definition the support member cannot be a "bipolar" plate even if it were conductive, which it is not because it does not "act as an anode for one cell and a cathode for the adjacent cell."

(c) Claims 10, 11, and 13. With respect to claims 10, 11, and 13, the Examiner states:

> [T]he arrangement of the contacts [70] as shown in Figs. 2, 3 and 10 having an end affixed to the separator (20) and an extending free end (71) that will effectively operate in a spring-like manner upon compression of the stack. In addition these members are clearly defined as "elastically deformable electrically conductive members (70) at col. 4, ll. 35-38. Therefore, the members (70) are held to embody a spring."

At the outset, it is noted hereinabove that Fuglevand's support member 20 does not act as a BSP ("separator"). Additionally, Fuglevand's deformably electrically conductive members 70 do not have an end affixed to support member 20.

In Fuglevand, "individual conductor plates generally designated by the numeral 50 are matingly received within the individual cavities 34 which are defined by support member 20. The conductor plates which are fabricated from an electrically conductive substrate, have a substantially planar main body 51" (4:5-10), and "a cathode current collector is generally designated by the numeral 60, and rests in ohmic electrical contact with the main body 51 of the individual conductor plates 50. The cathode current collector, which is fabricated from an electrically conductive substrate, has a main body 61" (4:19-24). "The main body 51 [of the conductor plate 50] further has a conductive tab 54 which extends outwardly relative to the first end 52" (4:11-13). "[T]he main body 61 of the cathode current collector 60 defines a channel shaped member. The main body also has a first surface 65 which rests in ohmic electrical contact against

the main body 51 of the underlying conductor plate 50, and an opposite second surface 66 (431-37). "[E]lectrically conductive members 70 are formed in the main body 61 [of the cathode current collector] and extend downwardly from the second surface" (4:37-39) and the "electrically conductive members 70 have a cathode engagement surface 71, which rests in ohmic electrical contact against an adjacent cathode" (4:40-42).

In summary, Fuglevand's specification indicates that the individual conductor plates 50 fit into recesses in support member 20 (which is nonconductive) and cathode current collectors 60 "rest" against the conductor plates in "ohmic electrical contact." The conductive members 70 are formed in the main body 61 of the cathode current collectors 60 and have a cathode engagement surface 71 which "rests in ohmic electrical contact against an adjacent cathode." Clearly, from examining the figures and specification of Fuglevand, there is no indication that Fuglevand discloses that the conductive members 70 are "affixed" to "non-separator" 20 and are certainly not in "ohmic" electrical contact with support member 20 since support member 20 is electrically nonconductive.

Furthermore, the examiner indicates that the "extending free end (71) . . . effectively operate[s] in a spring-like manner upon compression of the stack." The fuel cell configuration described by Fuglevand does not comprise a fuel cell stack. To those familiar with the art, a "stack" is a collection of individual fuel cells connected through bipolar plates in which one side of the plate is the anode of one cell and the other side is the cathode of the next adjoining cell as described in "Fuel Cell – Green Power," Los Alamos National Laboratory, p.14, attached as Exhibit C.

Fuglevand itself confirms this definition, because it repeatedly distinguishes its "modular" assembly from "stack-like fuel cell devices" (14:14). At 1:39-43 of Fuglevand, the "subject matter of [Fuglevand's] invention" is specifically disclosed as "an ion exchange membrane fuel cell which achieves the benefits to be derived from the aforementioned technology, but *which avoids the detriments individually associated with stack type fuel cell designs*" (emphasis added). Fuglevand also contends that its

device can be quickly repaired with "simple hand tools", while repair of "*prior art stack arrangements* . . . may take hours to accomplish" (9:34-37).

Finally, claims 10 and 11 are directed to "a laminar electrical contact". The Examiner previously characterized Fuglevand's conductor plate 50 as the laminar electrical contact with respect to claims 1, 13, and 21. It appears that, with respect to claims 10, 11, and 13, conductor plate 50 is entirely ignored in favor of establishing that members 70 "embody a spring". Figures 3 and 10 clearly demonstrate that conductor plate 50 does not maintain electrical contact between members 70 and an MEA 101/105/102, as conductor plate 50 is located between cathode current collector 60 and nonconductive support member 20. Thus, the laminar electrical contact, as claimed in claims 10 and 11, is not present in Fuglevand.

Claim 13 requires four elements: (1) a BSP, (2) an MEA attached to the BSP, (3) flexible means for making electrical contact attached to the BSP on the opposite side of the MEA, and (4) a laminar electrical contact attached to the flexible means. In sum, with respect to element (1), support member 20 is not a BSP, and thus, Fuglevand does not disclose a BSP. With respect to element (2), even if support member 20 were a BSP, the MEA is not connected to the support member 20. With respect to element (3), even if Fuglevand's members 70 were equivalent to the "flexible means" of the present invention, and even if support member 20 were a BSP, members 70 are not attached to support member 20. Finally, with respect to element (4), even if conductor plate 50 were equivalent to the laminar electrical contact of the present invention, and even if members 70 were equivalent to the "flexible means", conductor plate 50 is not attached to members 70; members 70 are located on the opposite side of the cathode current collector 60. Each of these items is refuted in detail hereinabove.

(d) Claim 12. Claim 12 is directed to maintaining electrical contact between a BSP and an MEA in a fuel cell stack. As noted in detail hereinabove, there is no BSP in Fuglevand, nor is there a fuel cell stack. Furthermore, because Fuglevand's support member 20 is *nonconductive*, electrical contact cannot be maintained between support

member 20 and an MEA.

(e) Claims 14 and 15. Claims 14 and 15 require second and third laminar electrical contacts, respectively, attached to the flexible means. As noted in detail hereinabove, Fuglevand's conductor plate 50 is neither attached to nor in contact with members 70, nor is it in electrical contact with the MEA. This is clearly seen in Figures 3 and 10, which show conductor plate 50 in physical contact, but not electrical contact, with support member 20 (which is an insulator) and not in contact with, much less attached to, conductive members 70. Thus, Fuglevand has no laminar electrical contacts attached to members 70.

(f) Claims 17-19. Claim 17-19 are directed to fuel cell stacks comprising two modules and flexible means that press laminar electrical contacts of the first module into electrical contact with the MEA of the second module. As noted in detail hereinabove, the conductor plate 50 in Fuglevand does not contact the MEA. The Examiner equates the members 70 with the flexible means of the instant invention, but fails to note that members 70 exert no pressure on conductor plate 50, and do not "press" the conductor plate 50 into the MEA.

Finally, claim 19 requires that the second module comprises apertures in each of the laminar electrical contacts. Fuglevand does not disclose apertures, and, therefore, cannot possibly anticipate claim 19.

It is respectfully submitted that all the elements of each of claims 1, 9-15, 17-19, and 21 are not disclosed or taught in any manner by Fuglevand, and that the rejection under 35 U.S.C. § 102(e) must be withdrawn.

2. Claims 1, 9-15, 17-19, and 21 are nonobvious.

Claims 1, 9-15, 17-19, and 21 cannot be obvious over Fuglevand. Virtually all of the elements of the present invention are missing from Fuglevand. In addition, even if the Examiner's characterizations of Fuglevand's elements as equivalent to those of the instant invention were correct, none of the elements is arranged as required by the claims. Finally, the invention of Fuglevand is intended, by its own admission throughout

its specification, to solve various problems of fuel cell stack assemblies. There is no reference that could be combined with Fuglevand that would produce the present invention.

3. Rejection of Claims 2-8, 16, and 20 under 35 U.S.C. § 103(a).

Claims 2-8, 16, and 20 were rejected under 35 U.S.C. § 103(a) as being anticipated by Fuglevand et al. (U.S. No. 6,468,682).

All arguments made in section 1(a)-1(f) hereinabove are specifically incorporated with respect to sections 3(a)-3(e).

(a) Claims 2 and 16. Claims 2 and 16 require that the laminar electrical contact further comprise apertures. The Examiner states that it would have been obvious "to employ apertures in the conductive laminar contacts, in order to securely attach the contacts to the compliant members".

However, the Examiner has characterized members 70 in Fuglevand as the compliant members of the present invention, and has characterized conductor plate 50 as the laminar electrical contacts. As noted as detail hereinabove, reference to Figures 3 and 10 in Fuglevand reveal that members 70 are located on the opposite side of the cathode current collector 60 from the conductor plate 50. That is, there is no contact whatsoever between the conductor plate 50 and the members 70. Thus, there is no basis for the Examiner's modification.

The Examiner's final statement regarding obviousness, "[t]he skilled artisan recognizes that fastening attachments such as apertures with screw fittings secure abutting members", is unclear, because apertures are not attachments. Moreover, the Examiner's suggestion to attach two elements of a reference together, when the reference itself shows neither attachment between the elements nor suggests any such attachment, is nothing more than unbridled speculation, which is improper in an obviousness determination.

(b) Claims 3 and 4. Claims 3 and 4 require second and third conductive laminar electrical contacts, respectively, attached to the independently acting compliant

members. As discussed in detail hereinabove, Fuglevand does not disclose any such thing. Even if conductor plate 50 were equivalent to the laminar electrical contact, and even if members 70 were equivalent to the independently acting compliant members, Fuglevand simply does not show that conductor plate 50 is attached to members 70.

(c) Claim 5. Claim 5 requires that the independently acting compliant members comprise springs. This issue is specifically addressed in section 1(c) hereinabove. In sum, In addition to the lack of any element equivalent to a BSP, members 70 are not attached to support member 20, and conductor plate 50 is not attached to members 70.

(d) Claim 6-8. Claims 6-8 require that the laminar electrical contacts are formed into an array having a length or a width, and that the MEA is approximately equal to the length or width of the array (whichever is specified in the claims). In response, the Examiner states

> [T]he electrical contacts (20) are formed into an array having a length and width, wherein the MEA has a respective length and width and wherein the length and width of the array of contacts (20) is approximately equal to the length and width of the MEA (Figs. 1-3)."

The Examiner initially characterized conductor plate 50 as the laminar electrical contact of the present invention, but appears to be referring to the support member 20 in this rejection. An examination of the figures in Fuglevand reveals that neither conductor plate 50 nor support member 20 is formed into an array of any sort. In fact, the MEA elements in Fuglevand appear to be several separate MEAs (see, e.g., Fig. 9) that eventually rest over members 70 (see Figs. 2, 10).

In Figure 9, an exploded view of the assembly associated with the anode heat sink is shown, which includes the MEAs 101. This assembly is fit onto the ends of the support member assembly, as shown in Figure 2. The vertical section shown in Fig. 10 shows that the MEAs do not have the same length or width as either the conductor plate or the support member. Even if it did, there is no array of laminar electrical contacts present in Fuglevand.

(e) Claim 20. Claim 20 requires modules having apertures in each of its laminar electrical contacts. The elements of claim 20 are discussed in detail hereinabove in sections 1(f) and 3(a). Fuglevand contains no teaching whatsoever that laminar electrical contacts of a first module are pressed by flexible means into electrical contact with the MEA in a second module. Using the Examiner's characterized equivalents, Fuglevand does not disclose any manner in which conductor plate 50 is pressed into the MEA.

It is respectfully submitted that all the elements of each of claims 2-8, 16, and 20 are not rendered obvious by Fuglevand, and, in fact, not all elements of claims 2-8, 16, and 20 are even disclosed or taught in any manner by Fuglevand. Thus, the rejection under 35 U.S.C. § 103(a) must be withdrawn.

4. Amendments Made Without Prejudice or Estoppel.

Notwithstanding the amendments made and accompanying traversing remarks provided above, Applicants have made these amendments in order expedite allowance of the currently pending subject matter. However, Applicants do not acquiesce in the original ground for rejection with respect to the original form of these claims. These amendments have been made without any prejudice, waiver, or estoppel, and without forfeiture or dedication to the public, with respect to the original subject matter of the claims as originally filed or in their form immediately preceding these amendments. Applicants reserve the right to pursue the original scope of these claims in the future, such as through continuation practice, for example.

5. Conclusion.

Based on the foregoing, Applicants respectfully request that the various grounds for rejection in the Office Action be reconsidered and withdrawn with respect to the presently amended form of the claims, and that a Notice of Allowance be issued for the present Application to pass to issuance.

In the event any further matters remain at issue with respect to the present application, Applicants respectfully request that the Examiner please contact the

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undersigned below at the telephone number indicated in order to discuss such matter prior to the next action on the merits of this application.

Date: 2/28/05

Respectfully submitted,

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